Math 124 K - Autumn 2007
Mid-Term Exam Number Two
November 20, 2007

Name: ______________________________

Signature: ______________________________

Student ID number: ____________________ Section: __________

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
Total	70	

- Complete all questions.
- You may use a scientific calculator during this examination; graphing calculators and other electronic devices are not allowed and should be turned off for the duration of the exam.
- If you use trial-and-error, a guess-and-check method, or numerical approximation when an exact method is available, you will not receive full credit.
- You may use one double-sided, hand-written, 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 80 minutes to complete the exam.

.

1. Find the derivative of each of the following functions. You need not simplify your results.

   (a) $f(x) = x^3 \cos(2x + e^x)$

   (b) $g(x) = \dfrac{x + x^3}{x - \sin x}$

2. For each of the following, find $\frac{dy}{dx}$. You need not simplify your results.

(a) $y = (x^3 + 1)^{(x^4 - 1)}$

(b) $\frac{x}{y} + \sin y + \cos x = 1$

3. Find the coordinates of the points on the curve defined by

$$\frac{4}{3}x^3 - x + y^2 = 1$$

at which the tangent line is horizontal.

4. Use a linear approximation at $x = 0.75$ to approximate the nearby solution of the equation

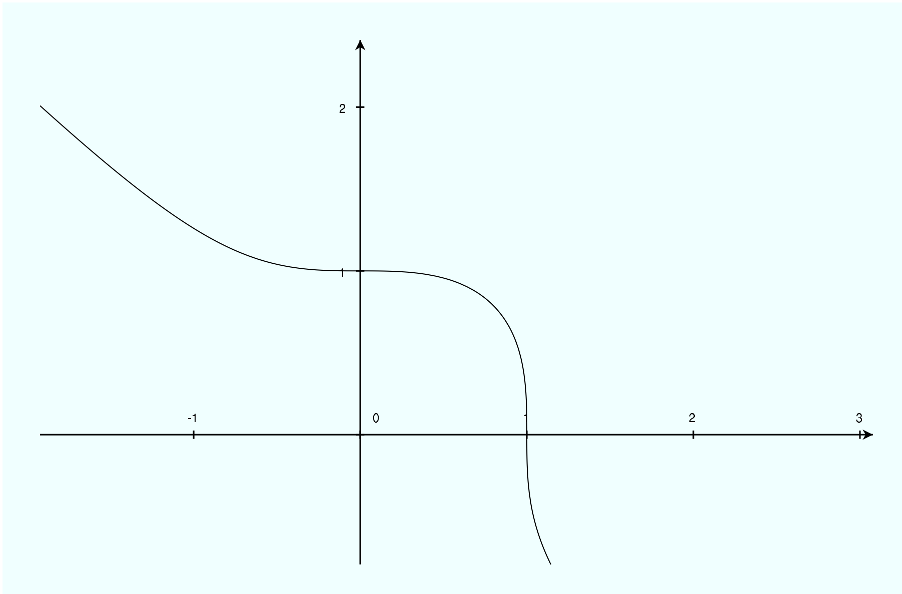
$$\ln x + x^2 = 0.$$

(That is, apply Newton's method to this equation with a starting value of 0.75, but just do one iteration.)

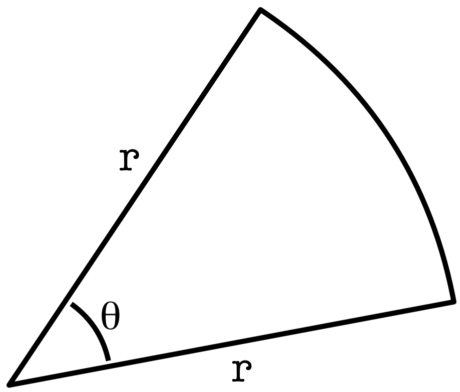
5. Find the points on the curve

$$x^3 + y^3 = 1$$

which have a tangent line that passes through the point $(2, 0)$.



6. A radioactive slice of pizza is changing shape. It is always a circular sector, but the radius r is increasing at 3 cm per hour and the angle θ is increasing at 1.5 radians per hour.



How fast is the area of the pizza slice changing when the radius is 8 cm and the angle is 2 radians?

7. Find the maximum and minimum values of the function

$$f(x) = \frac{(\ln x)^2}{x^3}$$

on the interval $[\frac{1}{2}, 3]$.